



**MITIGATING THE NUCLEAR 'DUAL-
USE DILEMMA': SUGGESTIONS FOR
THE ENHANCEMENT OF THE
CULTURE OF RESPONSIBILITY**

- Ilaria Anna Colussi -
(University of Liège, Belgium)

NUCLEAR AREA and 'DUAL-USE DILEMMA' (1)



Nuclear science and technologies have a 'double use':

medical, industrial, food, energy, and agriculture applications

Weapons of Mass Destruction (WMD)

NUCLEAR AREA and 'DUAL-USE DILEMMA' (2)

Two meanings:

- a) the same piece of research could benefit or harm the humanity (misuse); or
- b) research can have a civil or a military application (peaceful/non peaceful).



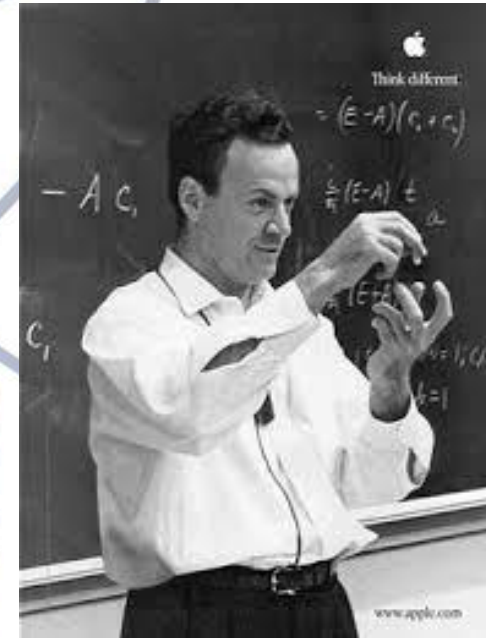
The dilemma refers to:

- Scientific research (e.g.: atomic fusion or atomic fission);
- Technological application of research (e.g.: dynamite).

NUCLEAR AREA and 'DUAL-USE DILEMMA' (3)

Richard Feynman (1918–1988),
Theoretical physicist:

“Once in Hawaii I was taken to see a Buddhist temple. In the temple a man said: «I am going to tell you something that you will never forget». And then he said: «To every man is given the key to the gates of heaven. The same key opens the gate of hell». And so it is with science. In a way it is a key to the gates of heaven, and the same key opens the gate of hell, and we do not have any instructions as to which is which gate”



NUCLEAR AREA and 'DUAL-USE DILEMMA' (4)



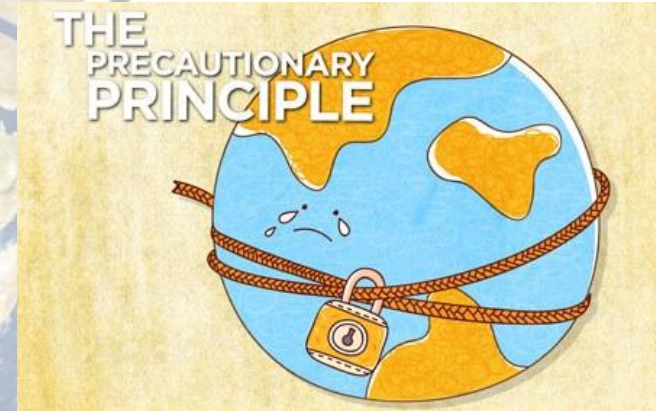
In front of the broad possibilities of the “**could**” area, what is the “**should**” issue?



The dual-use dilemma should be explored from the ethical and legal viewpoint.

THE GOVERNANCE OF NUCLEAR AREA (1)

- a) **Precautionary Principle (Kant: deontology) → 'better safe than sorry'**
- potential damage;
 - uncertain threat: lack of knowledge, of full certainty about the occurring of the damage and/or about the causal relationship between the action/inaction and the damage;
 - some kind of anticipatory regulation to adopt, i.e. before strong scientific proof of harm is developed.



Different versions of Precautionary Principle:

	Damage condition	Knowledge condition	Cost-effective measures	Burden of proof
Weak	Serious/ irreversible	Uncertainty but with scientific basis	Yes	Upon the proponents of precautionary measures
Moderate	Potential	Low level required	Not mentioned	Upon the proponents of precautionary measures
Strong	Potential	Suspected	Not relevant	Upon the proponents of new technology

→ It means that nuclear technologies should not be adopted until they are considered safe.

THE GOVERNANCE OF NUCLEAR AREA (2)

b) Proactionary Principle (Dewey: pragmatic ethics)

- science and technology considered safe, economically desirable and intrinsically good unless and until it is shown to be otherwise;
- the burden of proof upon those who want to slow down research;
- restrictive and proportioned measures adopted only if the impact of an activity has both significant probability and severity, and it is really imminent to occur.

→ It means to leave nuclear technologies develop without any control, or only if and when an urgent harm is going to happen.



THE GOVERNANCE OF NUCLEAR AREA (3)

c) Cost-benefit or risk-benefit approach (Mill, Bentham: utilitarian view)

- calculation of the relevant possible benefits and possible monetary costs of particular outcomes of an action or inaction;
- comparison of results;
- risk: cost of harm multiplied for the probability that the harm will occur;
- chosen policy: benefits $>$ costs and risks;
- utilitarian reasoning: maximization of benefits and minimization of harms.



→ It means that, when economic benefits overturn the disadvantages, nuclear technologies should be developed.

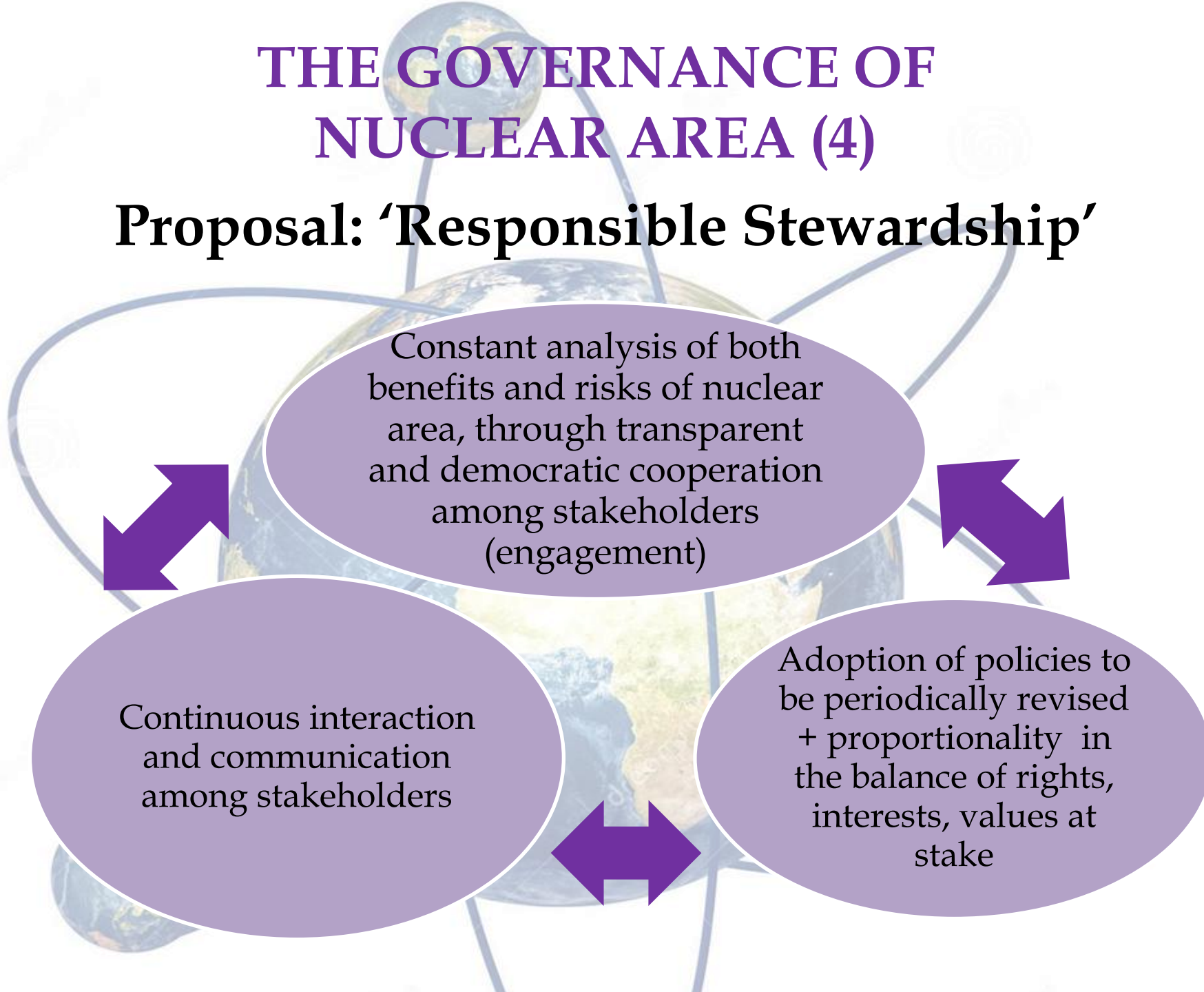
THE GOVERNANCE OF NUCLEAR AREA (4)

Proposal: 'Responsible Stewardship'

Constant analysis of both benefits and risks of nuclear area, through transparent and democratic cooperation among stakeholders (engagement)

Continuous interaction and communication among stakeholders

Adoption of policies to be periodically revised + proportionality in the balance of rights, interests, values at stake



Actors and Sources of the law:

Actors	Instruments for achieving the policy
Government (top down)	Hard law
Scientific community (bottom up)	Soft law
Hybrid or mixed model	Mixture of sources, engagement approach

→ PREFERENCE: both 'top down' and 'bottom up' sources through the involvement, in concentric circles, of:

- (a) individual scientists;
- (b) educational and research institutions;
- (c) scientific communities and/or organisations;
- (d) national governments; and
- (e) international bodies.

THE FREEDOM OF SCIENTIFIC RESEARCH AND SECURITY NEEDS (1)

The relationship between the freedom of research and the security needs is at the core of the 'dual-use dilemma'.

FREEDOM OF RESEARCH:

From the constitutional viewpoint, the freedom of scientific research is shaped as:

- (a) part of the content of the freedom of thought and expression,
- (b) a fundamental freedom having an autonomous content, and
- (c) a freedom which is connected to a duty for the State in improving and promoting science and research.

THE FREEDOM OF SCIENTIFIC RESEARCH AND SECURITY NEEDS (2)

SECURITY NEED:

A right?

- autonomous: individual and collective, or
- complementary to other rights (physical integrity, life, and health).

A need?



THE FREEDOM OF SCIENTIFIC RESEARCH AND SECURITY NEEDS (3)

THE BALANCE BETWEEN THE FREEDOM OF RESEARCH AND SECURITY NEEDS:

Through the principle of **reasonableness and proportionality**, which is composed of:

- *principle of suitability*: opting for a rational relationship between the means chosen and the ends pursued;
- *principle of necessity*: choosing the least interfering means for promoting one goal;
- *principle of proportionality in the narrow sense*: preserving the “essential core” of each right and freedom, despite limiting it.



The freedom of scientific research is like a person under one umbrella in a rainy day (Roberto Bin)



- 'Nucleus': absolute → the right to choose the topic of investigation and to exercise theoretical speculations;
- Further from the core nucleus: limits → in the phases of application, spread and diffusion of research.

Moreover, the freedom of scientific research is like a rubber band:



- a) if research affects other fundamental rights and freedoms, the research should be limited;
- b) if it increases and promotes the achievement of other rights and freedoms, the research ought to be encouraged.

Therefore:

- if nuclear technologies pose at risk humanity such as in the case of proliferation → the freedom of scientific research should be limited in name of security, but without infringing the “nucleus” of the freedom itself.
- If nuclear technologies encourage the progress for energy, medicine agriculture applications → the freedom of scientific research this freedom should be boosted and broadened.



CONCRETELY: HOW TO MANAGE THE 'DUAL-USE DILEMMA'?

1. Focus on **PEOPLE**: the level of scientific practice → rules for scientists (in the phase of acquirement, access, use of materials through periodic screening, plus education and training);
2. Focus on **MATERIALS/TECHNOLOGICAL APPLICATIONS** → rules about the traceability, possession, trade, transfer and storage of nuclear materials and technologies;
3. Focus on **INFORMATION** → the level of information dissemination: censorship or publication? (see Leo Szilard's and Enrico Fermi's positions) → debate between scientists, journal publishers and governments

CONCLUSIONS

In front of the 'dual-use dilemma' for nuclear science and technology → our ethical and legal proposal consists of an approach based on **stewardship and responsibility** through:

- engagement of stakeholders;
 - 'hard and soft law' sources;
 - a proper balance of rights and freedoms
- ...in order to pursue the progress in nuclear field, without neglecting our duties towards the humanity, future generations, and environment!





Thanks for your attention